CST1204: Introduction to Databases

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Week 4 Session 2

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Previous Session Review

- NULL and NOT NULL
- TAL Distributors Relational Model Review

Homework Review: Part I

- Create shorthand representation and CREATE, INSERT, SELECT statement for each table in Colonial Adventure Tours (Figure 1-4 to 1-8, Pg 9 - Pg 13)

Agenda

- Database Design Sample
- Normalization Review

Database Design Sample

Sample requirements and design process: Pg34 - Pg40

Database Design Steps (1 of 2)

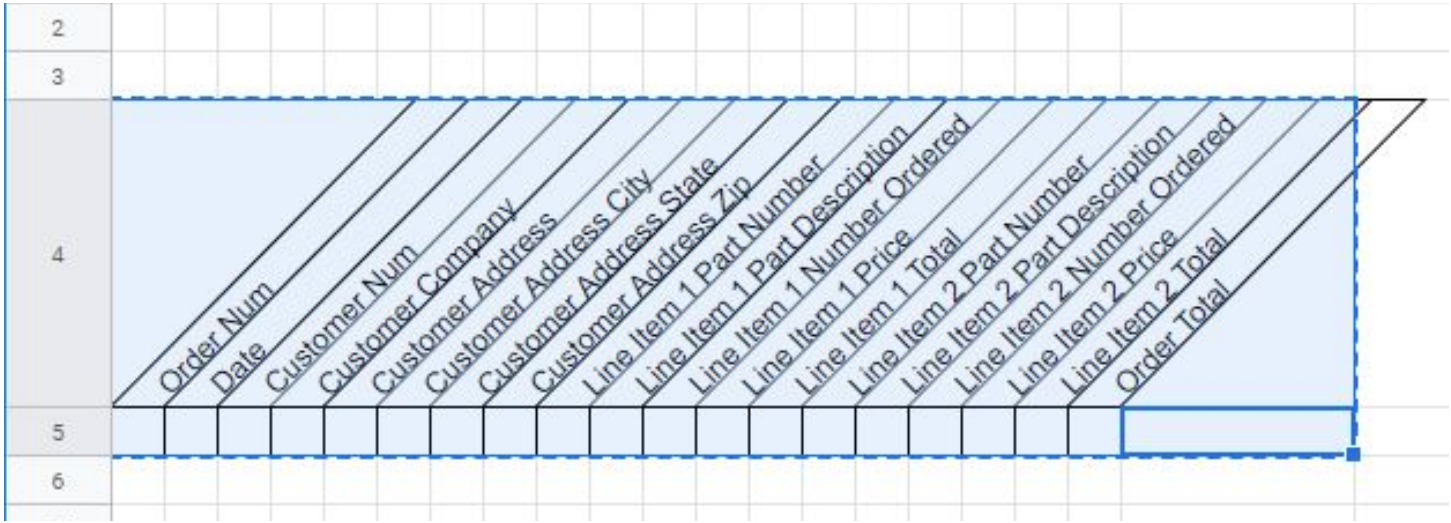
1. Read the requirements, identify the entities (objects) involved, and name the entities.
2. Identify the unique identifiers for the entities you identified in Step 1.
3. Identify the attributes for all the entities.
    - These attributes become the columns in the tables.
    - It is possible for two or more entities to contain the same attributes.

Database Design Steps (2 of 2)

4. Identify the functional dependencies that exist among the attributes.
5. Use the functional dependencies to identify the tables by placing each attribute with the attribute or minimum combination of attributes on which it is functionally dependent.
6. Identify any relationships between tables.

Order Table Design

- Designed directly from the original order sheet (Ch1, Pg3)



Normalization

- Normalization: The process to identify the existence of potential problems, such as data duplication and redundancy, and implement ways to correct these problems. The goal of this process is to allow you to take a table or collection of tables and produce a new collection of tables that represents the same information but is free of problems. (Ch 2, Pg 40)
- Normal Form (NF): A table in a particular normal form possesses a certain desirable collection of properties. (Ch 2, Pg 40) Usually this means elimination of data redundancy.

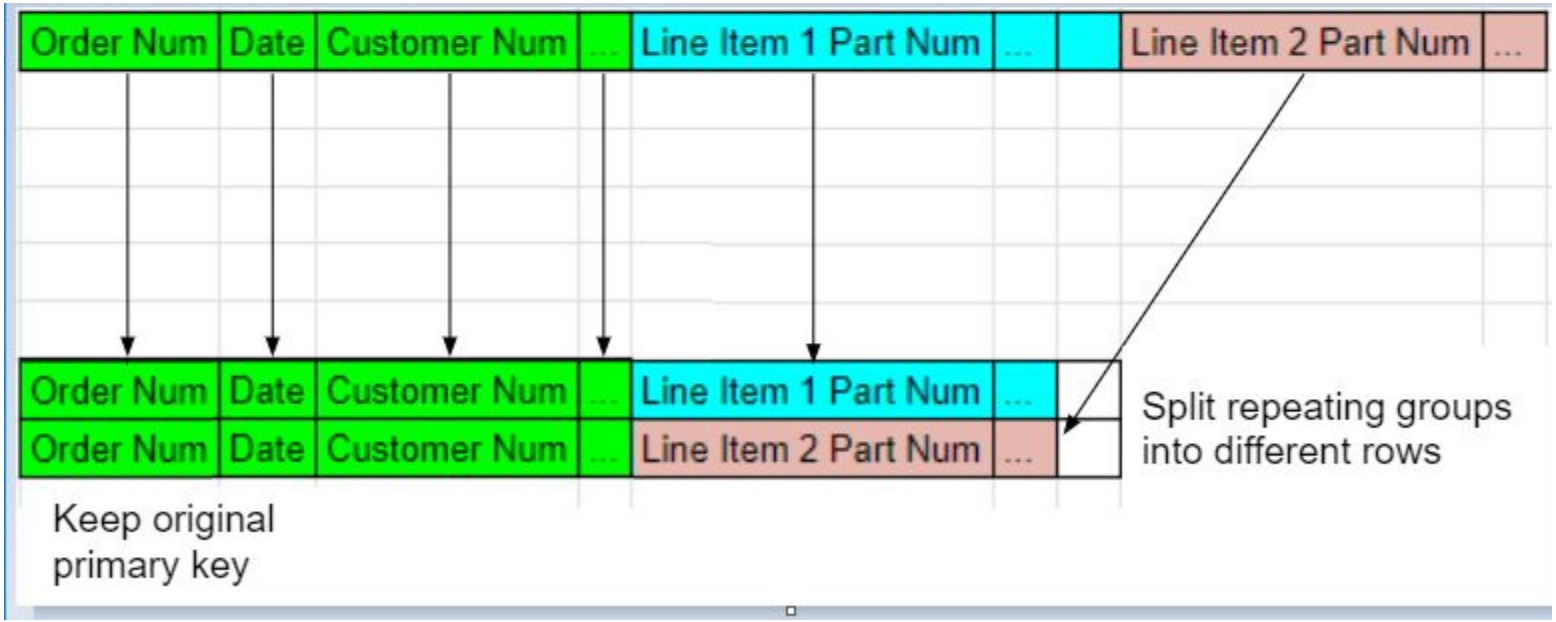
Normalization Process

- Normalization is generally achieved by “decomposition”: The process of breaking up or dividing a single relation into two or more
    - As the relation has fewer columns, its functional dependency becomes simpler to handle.

First Normal Form

- A table (relation) is in first normal form (1NF) when it does not contain a repeating group. (Ch 2, Pg 40)
- Order table: Multiple items Fig 2-7 (Ch2, Pg41)
    - Repeating group is not allow in a two dimensional table
- Decomposition: Break up the repeating group by breaking the groups into separate rows and pass the original primary key to each row: Order table Fig 2-8 (Ch2, Pg42)

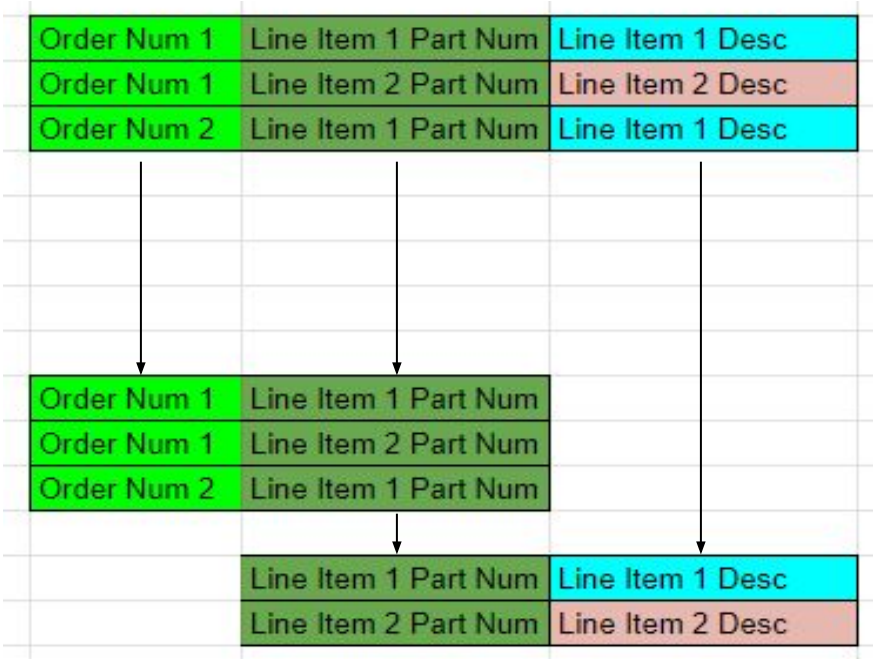
First Normal Form



Second Normal Form

- What if the primary key is a combination of columns?
  - Issues of example Pg43 - Pg44
- A table (relation) is in second normal form (2NF) when it is in first normal form and no nonkey column (a column that is not part of the primary key) is dependent on only a portion of the primary key. (Ch 2, Pg 44)
- Decomposition: Break up the partial key and its dependencies into another relation. Key column must remain in original table.
- Single column primary key + 1NF = 2NF

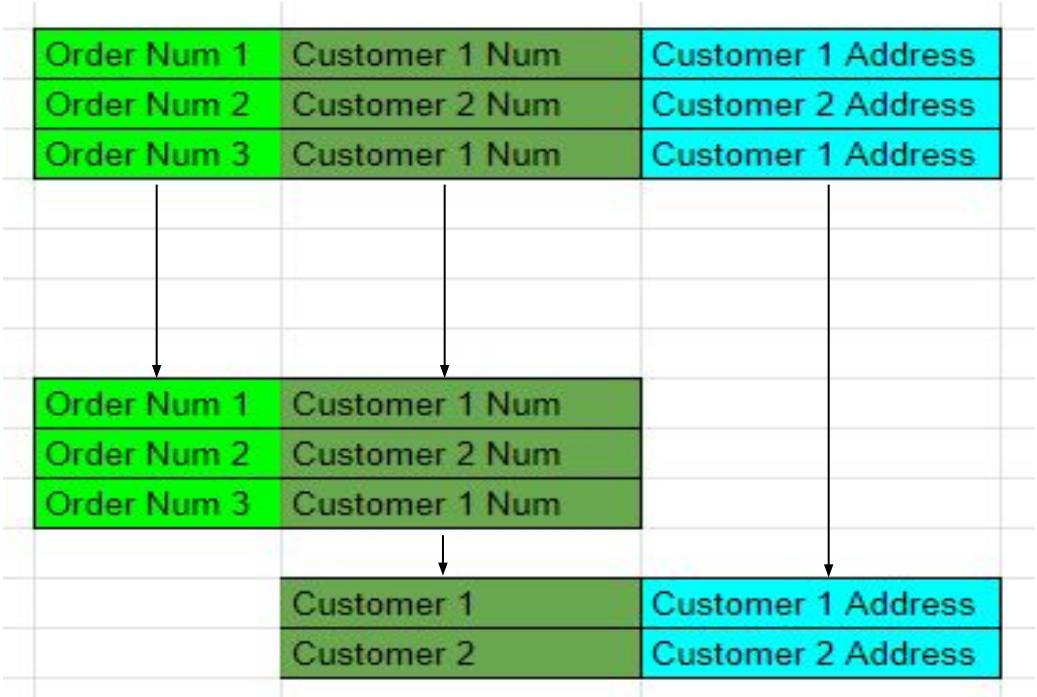
Second Normal Form



Third Normal Form

- What if a column has hierarchical function dependency?
  - Issues of example (Pg47)
- A table is in third normal form (3NF) when it is in second normal form and the only determinants it contains are candidate keys. (Ch 2, Pg 48)
  - Note: The form as stated above is in fact Boyce-Codd Normal Form (BCNF), an enhanced version of the original 3NF.
- Decomposition by breaking up hierarchical key and its dependencies into another relation. Key column must remain in original table. (Pg49)

Third Normal Form



Homework Review: Part II

- Chapter 2 exercise questions for Colonial Adventure Tours

Homework

- Create shorthand representation and CREATE, INSERT, SELECT statement for each table in Solmaris Condominium Group (Figure 1-4 to 1-8, Pg 9 - Pg 13)
- Chapter 2 exercise questions for Solmaris Condominium Group
- Chapter 3 exercise questions for Solmaris Condominium Group